Code No.: DS402PC | R20 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–II–Semester End Examinations (Regular) - June- 2022
DISCRETE MATHEMATICS
(Common to CSC, CSD)

[Time: 3 Hours] **[Max. Marks: 70]**

Note: 1. Answer *any FIVE questions. Each question carries 14 marks.*
2. All questions carry equal marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

5X14=70

1. a) Construct DNF for $P \wedge (P \rightarrow Q)$. [7M]
   b) Show that $S \vee R$ is Tautologically implied by $(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$. [7M]

2. a) Draw a Hasse diagram for X= {2, 3, 6, 24, 36, 48} and the relation ≤ be such that x≤y, if x divides y. [7M]
   b) Let A={1,2,3,4} and R={(1,1) , (1,2) , (1,3) , (2,1) , (2,2) , (2,3) , (3,1) , (3,2) , (3,3) , (4,4)}. Is R an Equivalence relation? [7M]

3. a) Write an algorithm for linear search and analyze the algorithm for its time complexity. [7M]
   b) Explain Asymptotic Notations with an example. [7M]

4. a) Solve the recurrence relation $a_n + a_{n-1} - 6a_{n-2} = 0$ for n≥2.Given that a_0= -1, a_1=8. [7M]
   b) In how many ways can 23 different books be given to 5 students so that 2 of the students will have 4 books each and other 3 will have 5 books each? [7M]

5. a) Define Minimal Spanning Tree. Construct a Minimal Spanning Tree using Prim's and Kruskal's Algorithm with an Example. [7M]
   b) Explain the Definitions [7M]
      i. Chromatic Number
      ii. Handshaking Property
      iii. Path,Circuit,Trail,Cycle.

6. a) Prove that the following argument is Valid [7M]

   For all x, [p(x) → q(x)]
   For all x, [q(x) → r(x)]
   ¬ r(c)

   ¬ p(c)

   b) Show that R→S can be derived from the premises P→(Q→S),(¬R V P) and Q. [7M]

7. a) Let f(x) = x+2, g(x)= x-2, h(x)=3x for all x∈ R where R is set of Real Numbers then find gOf, fOg, hOf, fO(gOh) [7M]
   b) Define Function. Explain various types of function with an example. [7M]

8. a) Define an algorithm and write the characteristics of algorithm. [7M]
   b) Describe space complexity and time complexity. [7M]

****